

Pygmy grasshoppers (Orthoptera: Tetrigidae) in Xinjiang, China: Species diversity and new synonyms

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Abstract: The species diversity of pygmy grasshoppers in Xinjiang Uygur Autonomous Region, China is determined. Three species, *Tetrix subulata* (Linnaeus, 1758), *Tetrix tartara* (Saussure, 1887), and *Tetrix tuerki* (Krauss, 1876), are recognized as distributed in Xinjiang. New synonyms are proposed: 1) *Tetrix subulata* (Linnaeus, 1758) = *Tetrix subulatoides* Zheng, Zhang, Yang & Wang, 2006, **syn. nov.**; 2) *Tetrix tartara* (Saussure, 1887) = *Tetrix fuhaiensis* Zheng, Zhang, Yang & Wang, 2006, **syn. nov.**, = *Tetrix jingheensis* Liang & Zheng, 1998, **syn. nov.**, = *Tetrix tartara subacuta* Bey-Bienko, 1951, **syn. nov.**, = *Tetrix xinjiangensis* Zheng, 1996, **syn. nov.**; and 3) *Tetrix tuerki* (Krauss, 1876) = *Tetrix torulosifemura* Deng, 2016, **nomen nudum**. The distribution information for these three *Tetrix* species is updated. We exclude the distribution of *Tetrix bolivari* Saulcy, 1901 in China, and temporarily exclude the distribution of *Tetrix japonica* (Bolívar, 1887) in Xinjiang.

Key words: Tetrigoidea; Tetriginae; distribution

新疆地区蚱类昆虫物种多样性及种类修订（直翅目：蚱科）

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摘要: 对新疆维吾尔自治区的蚱类昆虫物种多样性进行了修订和澄清。该地区共记录 3 种蚱：钻形蚱 *Tetrix subulata* (Linnaeus, 1758), 隆背蚱 *Tetrix tartara* (Saussure, 1887) 和土氏蚱 *Tetrix tuerki* (Krauss, 1876)。同物异名修订如下：1) 钻形蚱 *Tetrix subulata* (Linnaeus, 1758) = 拟钻形蚱 *Tetrix subulatoides* Zheng, Zhang, Yang & Wang, 2006, **syn. nov.**; 2) 隆背蚱 *Tetrix tartara* (Saussure, 1887) = 福海蚱 *Tetrix fuhaiensis* Zheng, Zhang, Yang & Wang, 2006, **syn. nov.**, = 精河蚱 *Tetrix jingheensis* Liang & Zheng, 1998, **syn. nov.**, = 亚锐隆背蚱 *Tetrix tartara subacuta* Bey-Bienko, 1951, **syn. nov.**, = 新疆蚱 *Tetrix xinjiangensis* Zheng, 1996, **syn. nov.**; 3) 土氏蚱 *Tetrix tuerki* (Krauss, 1876) = 瘤股蚱 *Tetrix torulosifemura* Deng, 2016, **nomen nudum**。本文更新了 3 种蚱的分布信息, 排除了波氏蚱 *Tetrix bolivari* Saulcy, 1901 在中国、以及暂时排除日本蚱 *Tetrix japonica* (Bolívar, 1887) 在新疆的分布。

关键词: 蚱总科; 蚱亚科; 分布

Introduction

Xinjiang Uygur Autonomous Region (34°25'–48°10'N, 73°40'–96°18'E, abbr. Xinjiang), the largest provincial level district (1.66 million km², 1/6 of the land area of China), is located in the northwest of China, and is the hinterland of the Eurasian Continent. Xinjiang is

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inserted between the Altay Mountains and the Kunlun Mountains. In their midst the Tianshan (Tien Shan) Mountains cross transversely with the sides filled by the Junggar Basin and the Tarim Basin. Xinjiang is adjacent to Russia, Kazakhstan, Kyrgyzstan, Tajikistan, Pakistan, Mongolia, India and Afghanistan. Although belonging to temperate continental climate and with less rainfall, the three great mountains are covered with snow for most of the year, providing year round water for the local vegetation. The Altay Mountains and Tianshan Mountains are covered by dense virgin forests, where numerous streams and many rivers flow (available from: <http://www.xinjiang.gov.cn/>, Fig. 1A). Under these warm and moist environments with rich vegetation in parts of Xinjiang, some pygmy grasshopper species have thus survived.

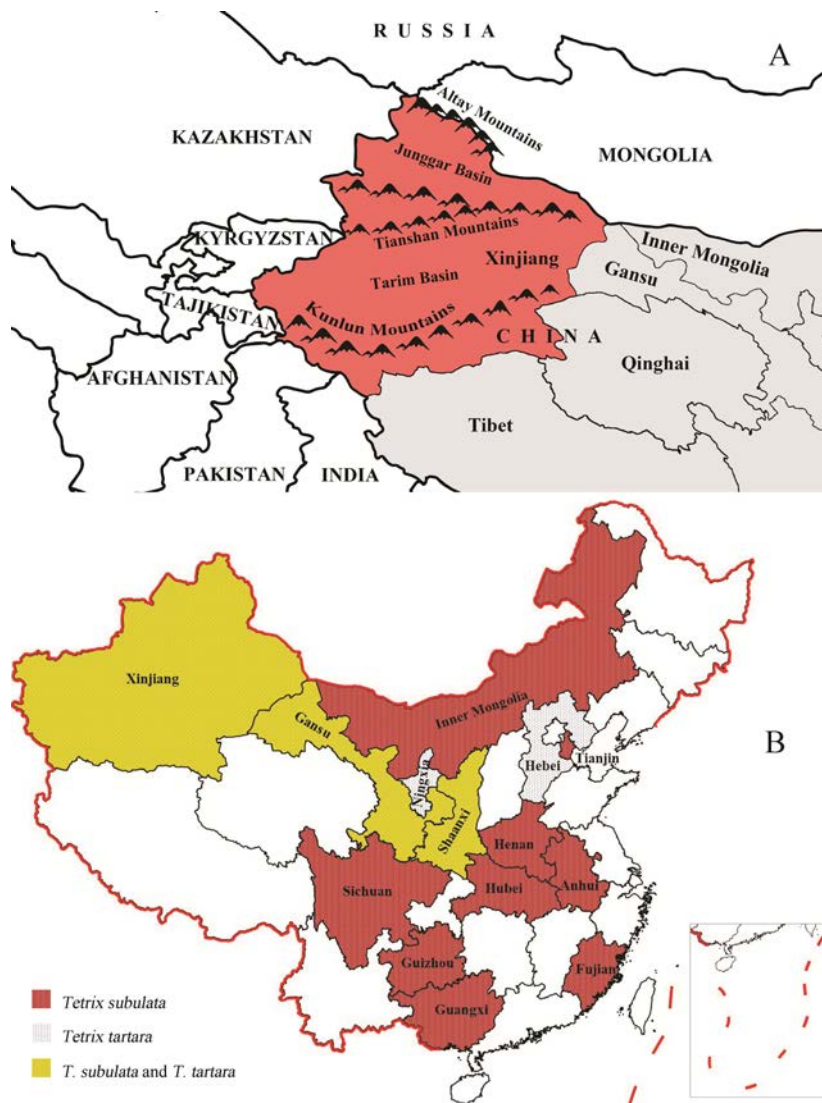


Figure 1. Geographical location of Xinjiang (A), and the distribution of *T. subulata* and *T. tartara* in China (B).

So far, seven pygmy grasshopper species (Tetrigidae: Tetriginae) have been recorded in Xinjiang. These include: 1) *Tetrix subulatooides* Zheng, Zhang, Yang & Wang from Xinyuan (Zheng *et al.* 2006); 2) *Tetrix fuhaiensis* Zheng, Zhang, Yang & Wang from Fuhai (Zheng *et al.* 2006); 3) *Tetrix torulosifemura* Deng *nomen nudum* from Korla Qapqal (Deng 2016); 4) *Tetrix tartara subacuta* Bey-Bienko from Wutai (Liang & Zheng 1998; Zheng 2005); 5) *Tetrix jingheensis* Liang & Zheng from Jinghe (Liang & Zheng 1998; Zheng 2005); 6) *Tetrix xinjiangensis* Zheng from Shihezi, Manas, Urumqi, Fuhai, Habahe, Qinghe, Ruqiang, Tekesi, Burqin, Altay, Yining, Heshun, Jinghe and Balikun counties (Zheng 1996a, 2005), and 7) *Tetrix bolivari* Saulcy from Xinjiang (Jiang & Zheng 1998; Liang & Zheng 1998; Zheng 2005).

During our investigation of insect diversity in Xinjiang in July 2017, we collected some information on pygmy grasshoppers in this region. Based on geography, the records listed above, and together with the specimens in our hands, we provide taxonomic clarification and describe the species diversity of Tetrigidae in Xinjiang.

Material and methods

Specimens were photographed using a Canon EOS 800D camera with a 100 mm macro lens. Pictures were stacked using Photoshop CS6 software. Morphological terminology and measurement landmarks follow Tumbrinck (2014) and Muhammad *et al.* (2018). For systematics of Tetriginae, we place most emphasis on head structure (Skejo 2017; Lu & Zha 2020). Measurements are given in millimeters (mm). Taxonomy follows Cigliano *et al.* (2021). The images of the three recorded species are also available in the Orthoptera Species File database (Cigliano *et al.* 2021). Voucher specimens are deposited in the Specimen Room of the School of Life Sciences, Huaibei Normal University (HNU), Huaibei, Anhui Province, China.

Taxonomy

Family Tetrigidae Rambur, 1838

Subfamily Tetriginae Rambur, 1838

Genus *Tetrix* Latreille, 1802

1. *Tetrix subulata* (Linnaeus, 1758) (Fig. 2)

Gryllus (*Bulla*) *subulatus* Linnaeus, 1758: 428 (lectotype – female, Sweden; in the Linnean Society, London, UK) = *Tetrix subulatooides* Zheng, Zhang, Yang & Wang, 2006: 498 (holotype – male & paratypes – 6 males, 3 females and 2 nymphs (1 male and 1 female), Xinyuan, Xinjiang, China; in Institute of Zoology, Shaanxi Normal University, Xi'an, China), **syn. nov.**

Other synonyms are available in the Orthoptera Species File database (Cigliano *et al.* 2021).

Notes. In the genus *Tetrix*, its type *Tetrix subulata* is characterized by slender body, smooth surface, obtusely angled and projected anterior margin of vertex, short antennae (the longest segment is about 1.8–2.5 times as long as wide), truncated anterior margin of pronotum, nearly flattened pronotal surface, and frontal costa together with medial carina of vertex being right-angled in lateral view (Storozhenko *et al.* 2015; pictures from Cigliano *et al.* 2021; Fig. 2). Zheng *et al.* (2006) introduced *Tetrix subulatooides* with a description and line drawings based on specimens from Xinjiang (Xinyuan). In comparison, *Tetrix subulatooides*

differs from *Tetrix subulata* mainly by its slightly shortened hind pronotal process and hind wings. According to the morphological variation of wing dimorphism in *Tetrix subulata* (Steenman *et al.* 2013; pictures from Cigliano *et al.* 2021), and the intraspecific variation law of hind wings and the pronotum in Tetrigidae (Zha *et al.* 2021), we herein synonymize *Tetrix subulatoides* with *Tetrix subulata*.

Specimens examined. 3♂2♀, **China**, Xinjiang, Zhaosu County, 42°38'N, 80°47'E, alt. 2200–2300 m, 09-VII-2017, collected by Lingsheng ZHA.



Figure 2. *Tetrix subulata*. A, B. Male bodies, lateral and dorsal; C, D. Female bodies, lateral and dorsal. Scale bars = 2 mm.

Distribution. Europe (except the extreme North); almost all Siberia (including the Tyva Republic and southern part of Krasnoyarsk region) and the Far East (except Chukotka, Kamchatka and Kurile Islands); the Caucasus; Kazakhstan; mountains of Middle Asia; Mongolia; China (Xinjiang, Gansu, Inner Mongolia, Tianjin, Shaanxi, Henan, Anhui, Hubei, Sichuan, Guizhou, Fujian, Guangxi; Zheng 2005; this study; Fig. 1A); Korea; North America (Sergeev *et al.* 2019).

2. *Tetrix tartara* (Saussure, 1887) (Figs 3, 4)

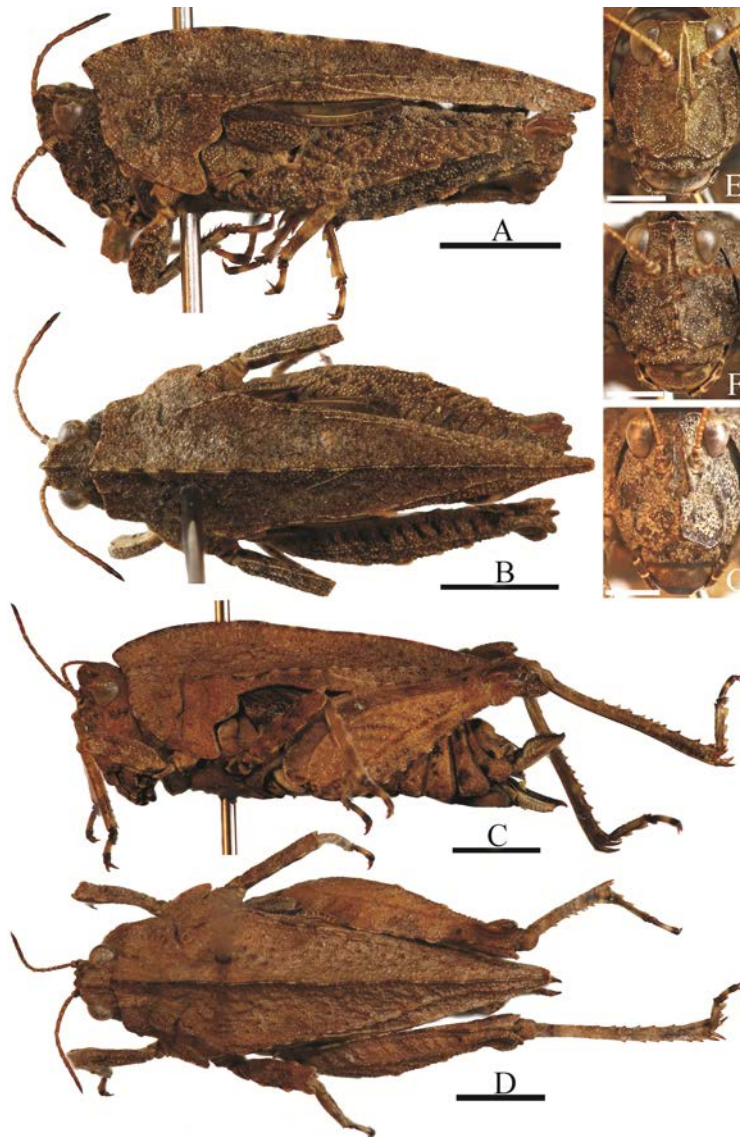


Figure 3. The brachypterous morph of *Tetrix tartara*, and faces of *Tetrix subulata* and *Tetrix tartara*. A–D. Brachypterous *Tetrix tartara* (male and female), lateral and dorsal views; E. *Tetrix subulata* (female), frontal view; F. Brachypterous *Tetrix tartara* (female), frontal view; G. Macropterous *Tetrix tartara* (female), frontal view. Scale bars = 2 mm (Figs A–D), 1 mm (Figs E–G).

Tettix tartarus Saussure, in: Bolívar, 1887: 262 (syntypes—1 male and 1 female; Turkestan, Kazakhstan; in Mus. Nat. Geneva, Switzerland)

= *Tettix tartara subacuta* Bey-Bienko, 1951: 97 (holotype—female; Kazakhstan; in Zoological Institute, St. Petersburg, Russia; two female paratypes (from Kazakhstan) in the Natural History Museum, London, UK) **syn. nov.**

= *Tettix xinjiangensis* Zheng, 1996a: 85, 88 (holotype—female, paratypes—52 males and 47 females; Xinjiang, China; in Institute of Zoology, Chinese Academy of Sciences, Beijing, China), **syn. nov.**

= *Tettix jingheensis* Liang & Zheng, 1998: 153 (holotype—female; Jinghe, Xinjiang, China; in Research Institute of Entomology (the Insect Museum), Zhongshan University, Guangzhou, China), **syn. nov.**

= *Tettix fuhaiensis* Zheng, Zhang, Yang & Wang, 2006: 499, 500 (holotype—male, paratypes—1 male and 3 nymphs (2 males and 1 female); Fuhai, Xinjiang, PR China; in Institute of Zoology, Shaanxi Normal University, Xi'an, China), **syn. nov.**

Other synonyms are available in the Orthoptera Species File database (Cigliano *et al.* 2021).

Taxonomy of *Tettix tartara tartara* and *Tettix tartara subacuta* are always confused. Morphologically, they can only be distinguished by two indistinct characters: the height of median carina of pronotum (the former slightly higher than the latter), and the shape of anterior margin of pronotum in dorsal view (acutely angled vs. obtusely angled) (Benediktov 2014). Geographically, they were all reported from the same or adjacent regions (Benediktov 2014; Deng 2016; Sergeev *et al.* 2019; this study). Specimens from Xinjiang possess both acutely and obtusely angled anterior margins of pronota; also the heights of median carinae of their pronota are more or less different (e.g. Figs 3, 4). For these reasons, and in order to avoid unnecessary taxonomic confusion, we combine the two subspecies into one species.

Tettix tartara is characterized by: arcuate (or nearly angulate) and projected anterior margin of vertex, short antennae (the longest segment is about 3–4 times as long as wide), angulate anterior margin of pronotum, lamellate pronotum, frontal costa is concave before eyes and frontal costa together with medial carina of vertex is rounded in lateral view. *Tettix tartara* is most similar to *Tettix simulans* (Bey-Bienko), but the latter differs in: anterior margin of vertex is nearly truncated, frontal costa is weakly concave before eyes and frontal costa together with medial carina of vertex is nearly right-angled in lateral view (Storozhenko *et al.* 2015). In China, many *Tettix simulans*-like species have been described and are wanted for taxonomic clarifications.

Tettix bipunctata (Linnaeus) is also similar to *Tettix tartara*, but its frontal costa together with medial carina of vertex is wholly arcuate in lateral view [Storozhenko *et al.* 2015; pictures of *Nomotettix arcticus* Hancock (= *Tettix bipunctata*) from Cigliano *et al.* 2021; the typical character of the genera *Hedotettix* Bolívar and *Coptotettix* Bolívar and the species is in need of being revised in future work]. In China, Liang & Zheng (1998) recorded *Tettix bipunctata* from Inner Mongolia (Deerbuier), but according to the description and line drawing provided, the record is most likely *Tettix ceperoi ceperoi* (Bolívar) [the other subspecies *Tettix ceperoi chinensis* Liang (from Guangdong and Henan; Liang & Zheng 1998), and the Chinese record *Tettix ceperoi* (Bolívar) (widely distributed in Guangxi, Guangdong, Yunnan, Henan, Hubei and Shaanxi; Zheng 2005), are almost certainly the macropterous morph of *Tettix japonica* (Bolívar), based on their descriptions and distribution]. *Tettix japonica* from China is comprised of too many synonyms which will require formal revision in future work. *Tettix eyouqiensis* Zheng, *nomen dubium* and *Tettix sinufemoralis* Liang (= *Tettix eyouqiensis*, noted

by Zheng 1996b) are also described from Inner Mongolia. According to their descriptions and the line drawings provided (Zheng 1996b; Liang & Zheng 1998), these two species are probably *Tetrix bipunctata*.

In China, specimens of *Tetrix tartara* have been described as different species, and we herein synonymize them.

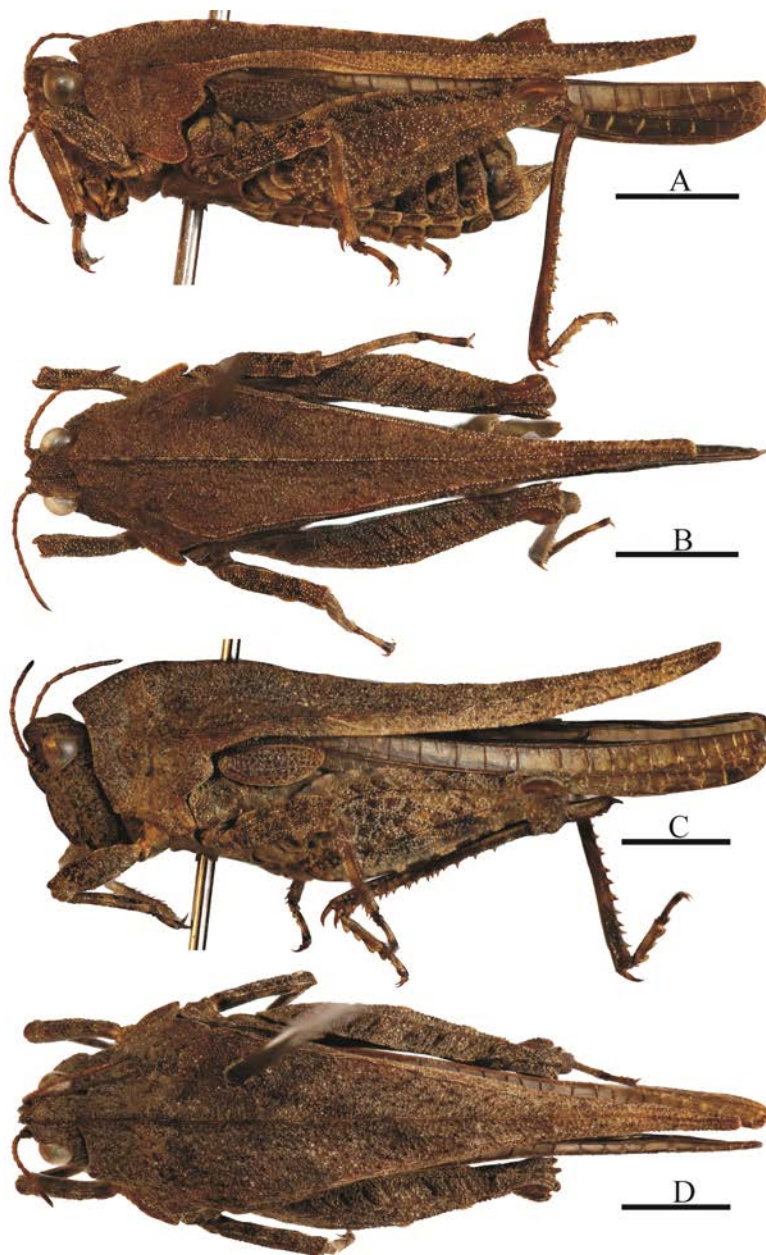


Figure 4. The macropterous morph of *Tetrix tartara*. A, B. Male bodies, lateral and dorsal views; C, D. Female bodies, lateral and dorsal views. Scale bars = 2 mm.

Tetrix fuhaiensis Zheng, Zhang, Yang & Wang, **syn. nov.**. Zheng *et al.* (2006) described the species based on 2 males and 3 nymphs from Xinjiang (Fuhai). According to their description, line drawings and distribution, this is the brachypterous morph of *Tetrix tartara* (e.g. Fig. 3).

Tetrix jingheensis Liang & Zheng, **syn. nov.**. Liang & Zheng (1998) described this species based on 1 female from Xinjiang (Jinghe). Its description, line drawings and distribution match the characters of the macropterous morph of *Tetrix tartara* (e.g. Figs 4C, 4D).

Tetrix xinjiangensis Zheng, **syn. nov.**. Zheng (1996a, 2005) described this species from Xinjiang (Shihezi, Manas, Urumqi, Fuhai, Habahe, Qinghe, Ruoqiang, Tekesi, Burqin, Altay, Yining, Heshun, Jinghe and Balikun counties). Its description, line drawings and distribution match the characters of the macropterous morph of *Tetrix tartara* (e.g. Figs 4A, 4B).

Specimens examined. Macropterous morph: 2♂1♀; brachypterous morph: 37♂22♀; nymphs: 2♂1♀. **China**, Xinjiang (Jinghe, Huocheng, Qapqal, Yining and Zhaosu counties), 42°36'–44°42'N, 80°36'–82°58'E, alt. 350–2500 m, 04–12-VII-2017, collected by Lingsheng ZHA.

Distribution. Russia (Astrakhan region, Russian Altai, the Tyva Republic); Kazakhstan; Uzbekistan; Turkmenistan; Iran; Afghanistan; Tajikistan; Kyrgyzstan, northern China (Xinjiang, Gansu, Ningxia, Shaanxi, Hebei; Deng 2016; this study; Fig. 1B); northwestern Mongolia (Benediktov 2014; Sergeev *et al.* 2019).

3. *Tetrix tuerki* (Krauss, 1876)

Tetrix türki Krauss, 1876: 103 (syntypes—males & females; Europe (Austria, Yugoslavia); in Naturhistorisches Museum Wien, Vienna, Austria, and the Natural History Museum, London, UK).

= *Tetrix torulosifemura* Deng, 2016, *nomen nudum* (holotype—male, Korla, Xinjiang, China; paratype—1 male, Qapqal, Xinjiang, China; in the Insect Museum of Zhongshan University, Guangzhou, China)

Other synonyms are available in the Orthoptera Species File database (Cigliano *et al.* 2021).

The name *Tetrix torulosifemura* is given in the doctoral dissertation based on 2 males from Xinjiang (Korla and Qapqal) (Deng 2016). The description of this taxon was not published until now. Therefore *T. torulosifemura* must be considered as *nomen nudum* according to the Code of Zoological Nomenclature (ICZN 1999). We considered *Tetrix torulosifemura* as *Tetrix tuerki* based on two reasons: 1) its description and pictures exactly match the characters of the latter (Skejo *et al.* 2014, pictures from Cigliano *et al.* 2021); and 2) Tajikistan, one distribution area of *Tetrix tuerki* (Harz 1979), is adjacent to Xinjiang.

Tetrix tuerki is similar to the Chinese widespread species *Tetrix japonica*, but the ventral margins of its fore and mid femur are strongly undulated (straight to weakly undulated on *Tetrix japonica*), and the ventro-external carina of its hind femur has 2–3 conspicuous teeth (tooth absent on *Tetrix japonica*). *Tetrix tuerki* was recorded and illustrated from Guangxi (Zheng 2005), but morphological and geographical evidence supports it as being *Tetrix japonica* and we herein reject this Chinese record.

Distribution. The Alps; the Slovakian Tatra (the Carpathian Mt.) and the Balkans Mountains (Skejo *et al.* 2014); Tajikistan (Harz 1979); northwestern China (Xinjiang).

Discussion

The Chinese record of *Tetrix bolivari* Saulcy is questionable. Jiang & Zheng (1998), Liang & Zheng (1998), Zheng (2005) described *Tetrix bolivari* from most parts of China (including Xinjiang but there is lack of specimen information from Xinjiang). According to its description and wide distribution, it is almost certain that the Chinese *Tetrix bolivari* is actually the macropterous morph of *Tetrix japonica*. Considering the fact that *Tetrix bolivari* has a limited distribution in from southern Europe and the Middle East to Central Asia (Lehmann *et al.* 2017), we herein reject this Chinese record. We also temporarily exclude the distribution of *Tetrix japonica* in Xinjiang, because there is no specimen information (including the Chinese record of *Tetrix bolivari*) to provide support.

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References

- Benediktov AA. 2014. The new data on distribution of the pygmy grasshopper *Tetrix tartara* s.l. (Orthoptera: Tetrigoidea: Tetrigidae) and its vibrational signals. *Russian Entomological Journal*, 23(1): 1–4.
- Bey-Bienko GJ. 1951. Family Tetrigidae. In: Bey-Bienko GJ & Mistshenko LL (Eds.), *Locusts and Grasshoppers of the USSR and Adjacent Countries, Part I*. Academy of Sciences of USSR Publ., Moscow–Leningrad, 378 pp.
- Bolívar I. 1887. Essai sur les Acridiens de la tribu des Tettigidae. *Annales de la Société Entomologique de Belgique*, 31: 175–313.
- Cigliano MM, Braun H, Eades DC & Otte D. 2021. Orthoptera Species File. Version 5.0/5.0. Available from: <http://Orthoptera.SpeciesFile.org> (Accessed 1 September 2021)
- Deng WA. 2016. *Taxonomic Study of Tetrigoidea from China*. Doctoral Dissertation, Huazhong Agricultural University, Wuhan, 339 pp.
- Harz VK. 1979. Zwei neue *Tetrix*-Unterarten aus Tadshikistan (Orthoptera, Caelifera). *Articulata*, 1(13): 127–134.
- International Commission on Zoological Nomenclature. 1999. *International Code of Zoological Nomenclature (4th Edition)*. International Trust for Zoological Nomenclature, London, 306 pp.
- Jiang GF & Zheng ZM. 1998. *Grasshoppers and Locusts from Guangxi*. Guangxi Normal University Press, Guilin, 390 pp.
- Krauss HA. 1876. *Tettix türki* nov. spec. (Orthopt.). *Entomologische monatsblätter*, (1): 103–104.
- Lehmann AW, Devriese H, Tumbrinck J, Skejo J, Lehmann GUC & Hochkirch A. 2017. The importance of validated alpha taxonomy for phylogenetic and DNA barcoding studies: a comment on species identification of pygmy grasshoppers (Orthoptera, Tetrigidae). *ZooKeys*, 679: 139–144.
- Liang GQ & Zheng ZM. 1998. *Fauna Sinica, Insecta. Vol. 12, Orthoptera, Tetrigoidea*. Science Press, Beijing, 278 pp.

- Linnaeus C. 1758. *Systema Naturae* (10th edition). Laurentii Salvii, Holmiae, 824 pp.
- Lu YZ & Zha LS. 2020. A new species of the genus *Lamellitettigodes* (Orthoptera: Tettigidae) from PR China, with taxonomic notes on the genus. *Zootaxa*, 4851(2): 338–348.
- Muhammad AA, Tan MK, Abdullah NA, Azirun MS, Bhaskar D & Skejo J. 2018. An annotated catalogue of the pygmy grasshoppers of the tribe Scelimenini Bolívar, 1887 (Orthoptera: Tettigidae) with two new *Scelimena* species from the Malay Peninsula and Sumatra. *Zootaxa*, 4485(1): 1–70.
- Sergeev MG, Storozhenko SYu & Benediktov AA. 2019. An annotated checklist of Orthoptera of Tuva and adjacent regions. Part 2. Suborder Caelifera. Tridactylidae, Tettigidae, Acrididae: Melanoplinae, Calliptaminae, and Gomphocerinae (except Gomphocerini). *Far Eastern Entomologist*, 389: 7–44.
- Skejo J. 2017. *Taxonomic Revision of the Pygmy Devils (Tettigidae: Discotettiginae) With Online Social Media as a New Tool for Discovering Hidden Diversity*. Master Dissertation, University of Zagreb, Zagreb, Croatia, 235 pp.
- Skejo J, Rebrina F, Buzzetti FM, Ivković S, Rašić A & Tvrtković N. 2014. First records of Croatian and Serbian Tettigidae (Orthoptera: Caelifera) with description of a new subspecies of *Tetrix transsylvanica* (Bazyluk & Kis, 1960). *Zootaxa*, 3856(3): 419–432.
- Steenman A, Lehmann AW & Lehmann GUC. 2013. Morphological variation and sex-biased frequency of wing dimorphism in the pygmy grasshopper *Tetrix subulata* (Orthoptera: Tettigidae). *European Journal of Entomology*, 110: 535–540.
- Storozhenko SYu, Kim TW & Jeon MJ. 2015. *Monograph of Korean Orthoptera*. National Institute of Biological Resources, Incheon, 377 pp.
- Tumbrinck J. 2014. Taxonomic revision of the Cladonotinae (Orthoptera: Tettigidae) from the islands of South-East Asia and from Australia, with general remarks to the classification and morphology of the Tettigidae and descriptions of new genera and species from New Guinea and New Caledonia. In: Telnov D (Ed.), *Biodiversity, Biogeography and Nature Conservation in Wallacea and New Guinea, Volume II*. The Entomological Society of Latvia, Riga, pp. 345–396.
- Zha LS, Skejo J, Mao BY & Ding JH. 2021. Taxonomic revision of *Phaesticus* Uvarov and synonymy with *Flatocerus* Liang & Zheng syn. nov. (Orthoptera: Tettigidae). *Zootaxa*, 4965(3): 501–514.
- Zheng ZM. 1996a. Three new species of Tettigidae from China. *Acta Zootaxonomica Sinica*, 21(1): 83–88.
- Zheng ZM. 1996b. Two new species of *Tetrix* Latreille from China (Orthoptera: Tettigidae). *Journal of Hubei University (Natural Science)*, 18(2): 177–180.
- Zheng ZM. 2005. *Fauna of Tetrigoidea from Western China*. Science Press, Beijing, 501 pp.
- Zheng ZM, Zhang L, Yang L & Wang YF. 2006. Two new species of *Tetrix* Latreille from Xinjiang (Orthoptera: Tettigidae). *Journal of Huazhong Agricultural University*, 22(5): 498–500.